

# Optical Measurements: Update

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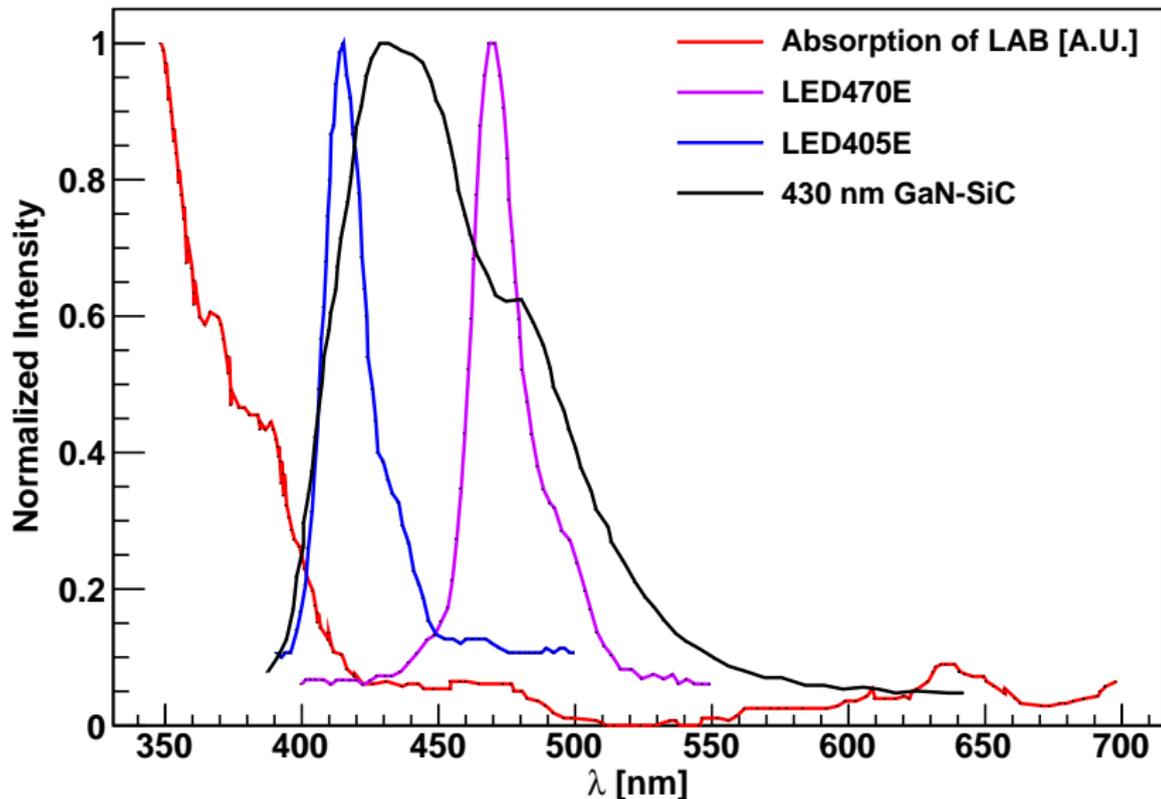
# Overview

- 1 Measurement Outline
- 2 Effects of Spectrum Width on Attenuation
- 3 Summary of March 24th Data

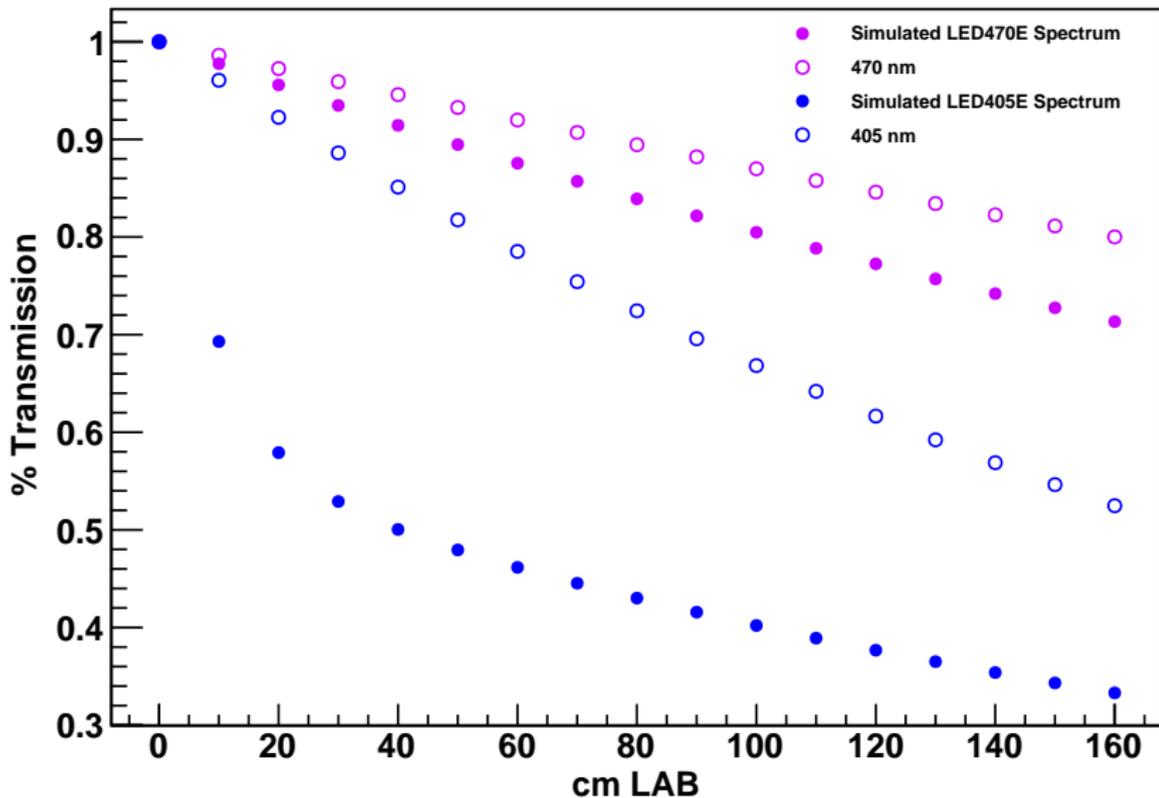
## First Pass Measurements to be completed before APS

- LAB @ 470/405 nm ✓
- Purified LAB @ 470/405 nm (Data taken but not analyzed) ✓
- Purified LAB + PPO @ 470/405 nm (Data taken but not analyzed) ✓
- Gd-LS @ 470/405 nm (tomorrow)

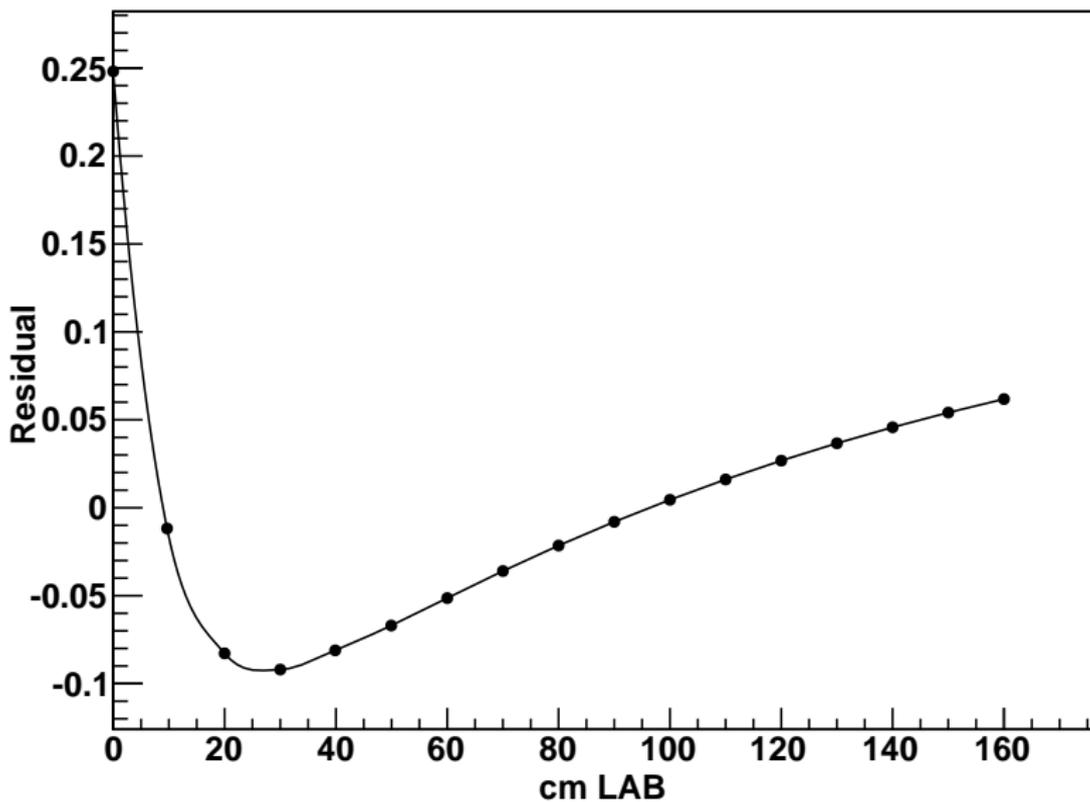
## Absorption Spectrum in LAB and Emission of Common LEDs



Simulated Extinction of Monochromatic and Measured LED Emission Spectra



Simulated LED405E Deviation from a Pure Exponential Extinction

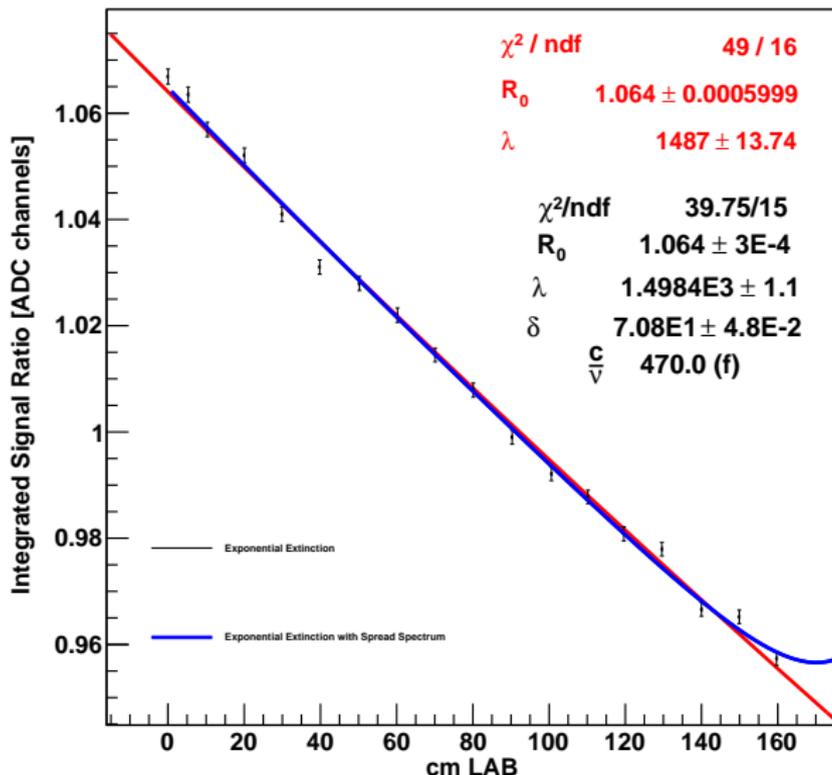


If the absorption is assumed to be approximately linear in the region centered on the band pass then we can approximate the light yield as:

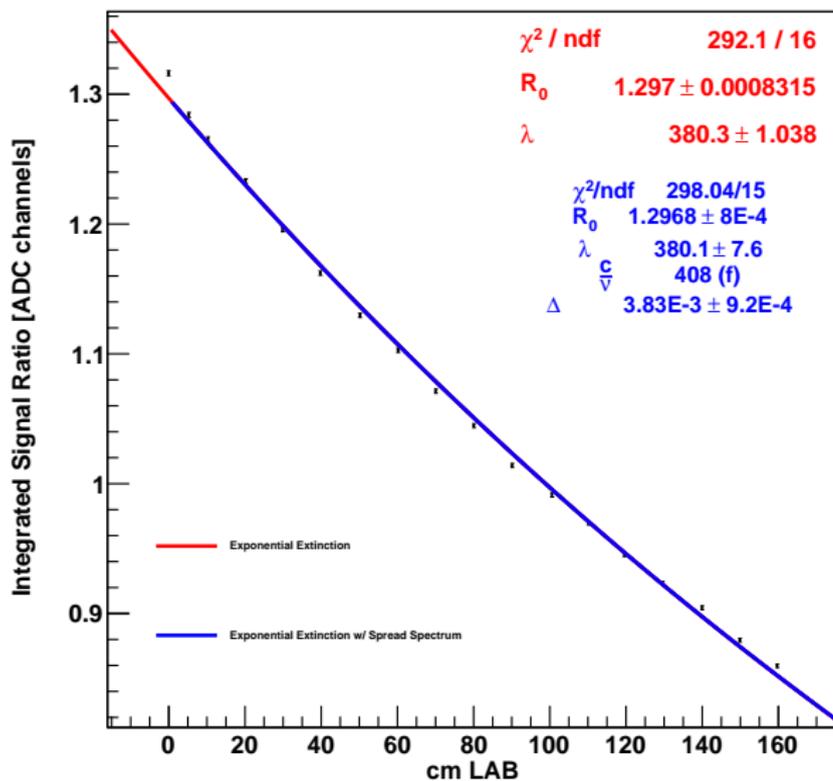
$$I(x) = I_0 \frac{\int F(\lambda) e^{\frac{-x}{l_c + \alpha(\lambda - d_{ac})}} d\lambda}{\int F(\lambda) d\lambda} \quad (1)$$

where  $l_c$ ,  $\alpha$  and  $\epsilon$  are taken to be the central attenuation length, the slope of  $l(\lambda)$  and the FWHM of  $F(\lambda)$  respectively.

Extinction of Filtered 470 nm Light in Unpurified LAB- 14 Mar 2009 - Series A



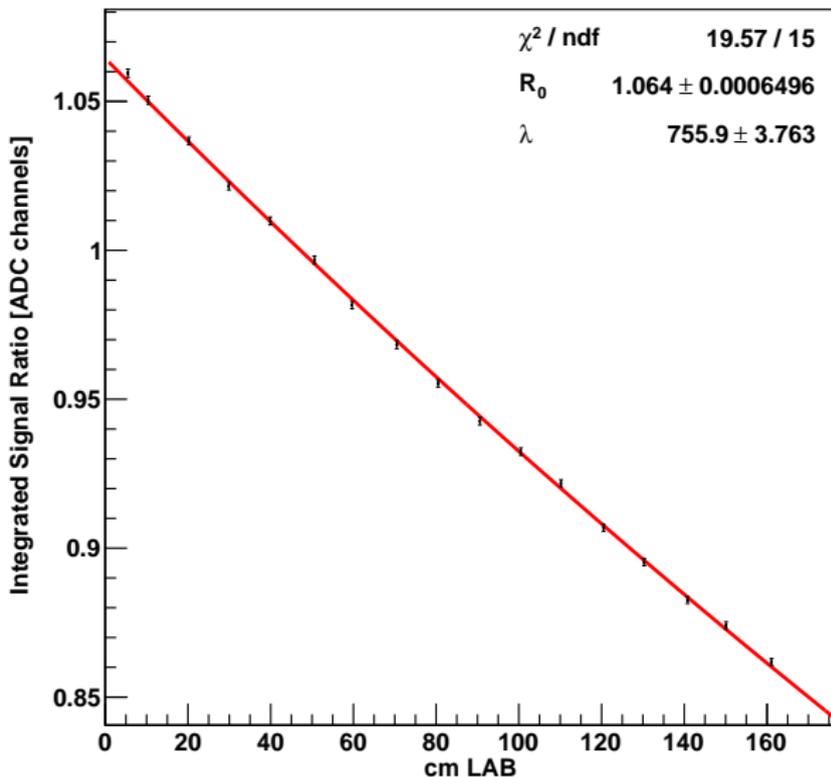
Extinction of Filtered 405 nm Light in Unpurified LAB - 14 Mar 2009 - Series A



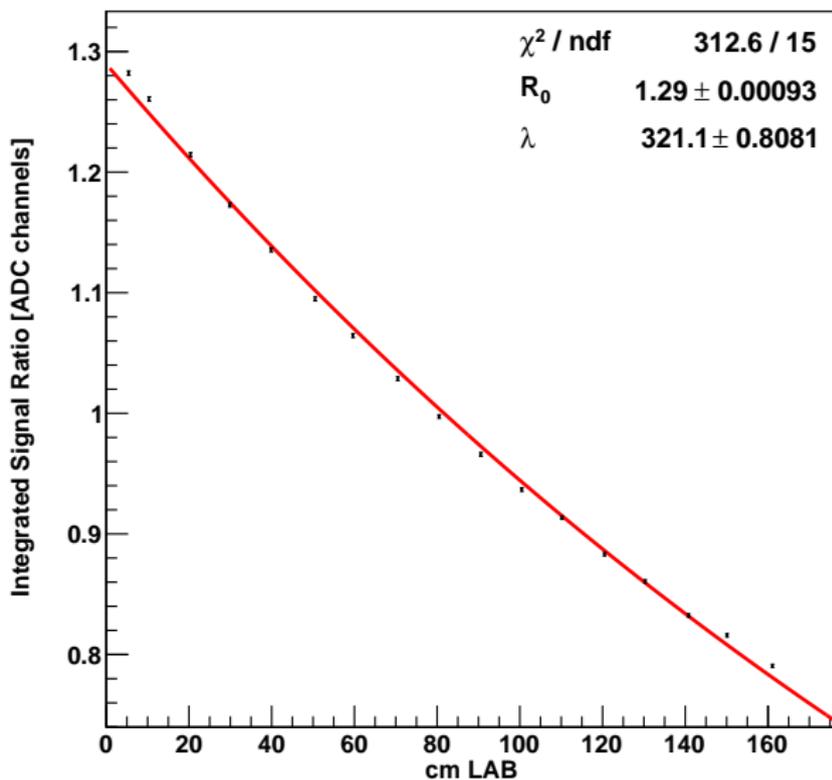
## March 24th Summary

- 4 Measurements taken overnight
- LED470E / LED405E
- Band Pass filters in place ( gaussian profile w 10 nm FWHM)
- 2 runs LAB (Series A, B)
- 2 runs purified LAB (Series C, D)

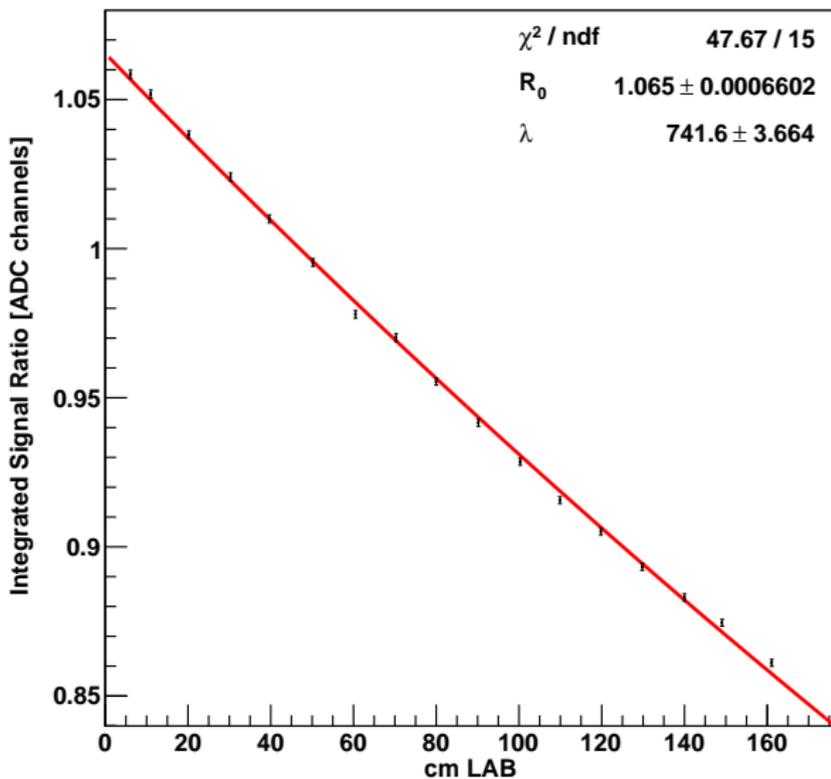
Extinction of  $470 \pm 5$  nm Light in Unpurified LAB - 24 March 2009 - Series A



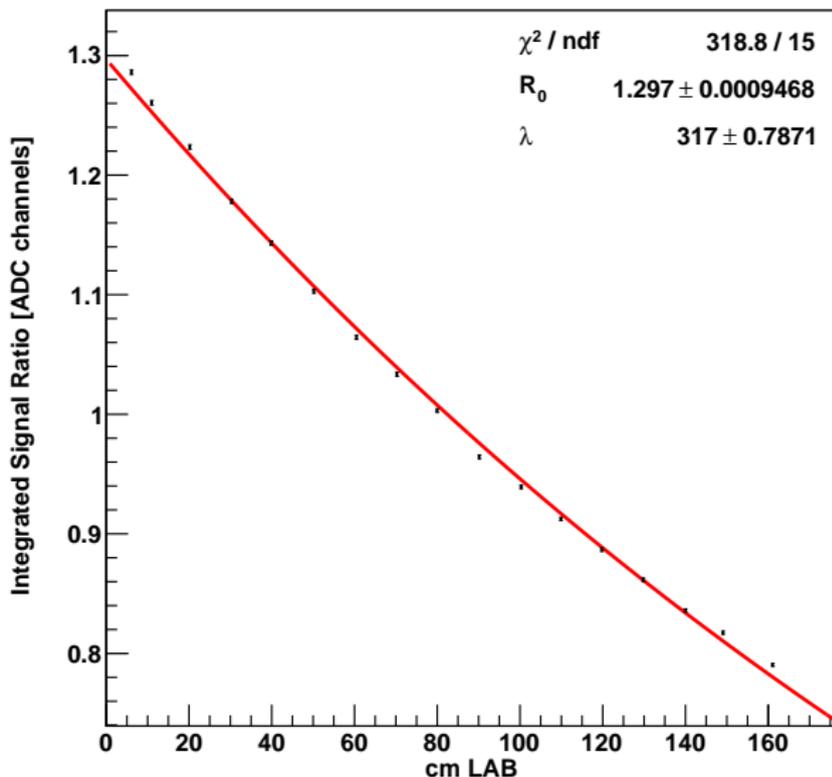
Extinction of  $405 \pm 5$  nm Light in LAB - 24 March 2009 - Series A



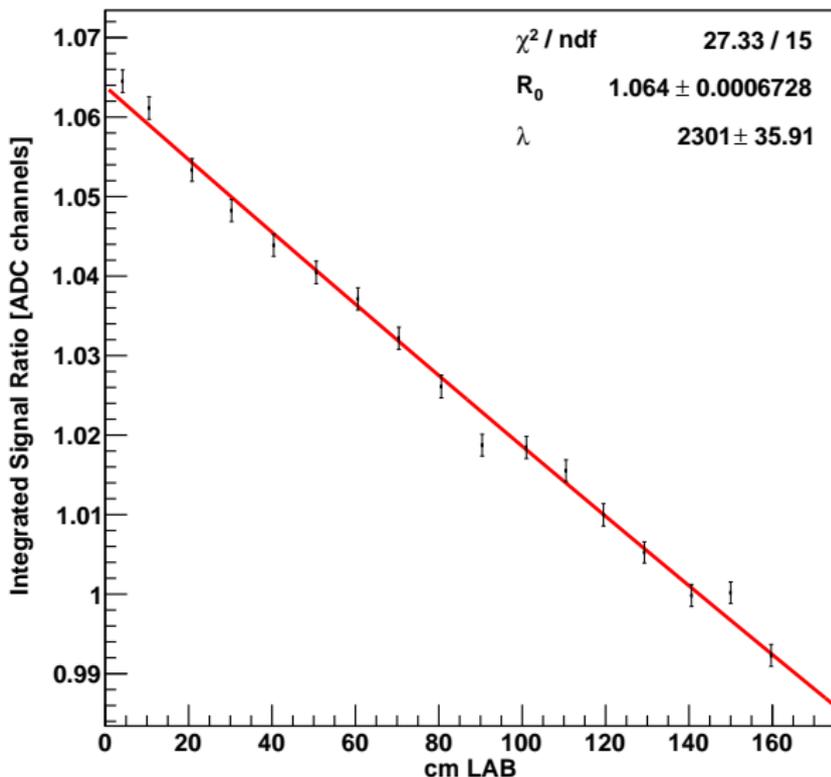
Extinction of  $470 \pm 5$  nm Light in LAB - 25 March 2009 - Series B



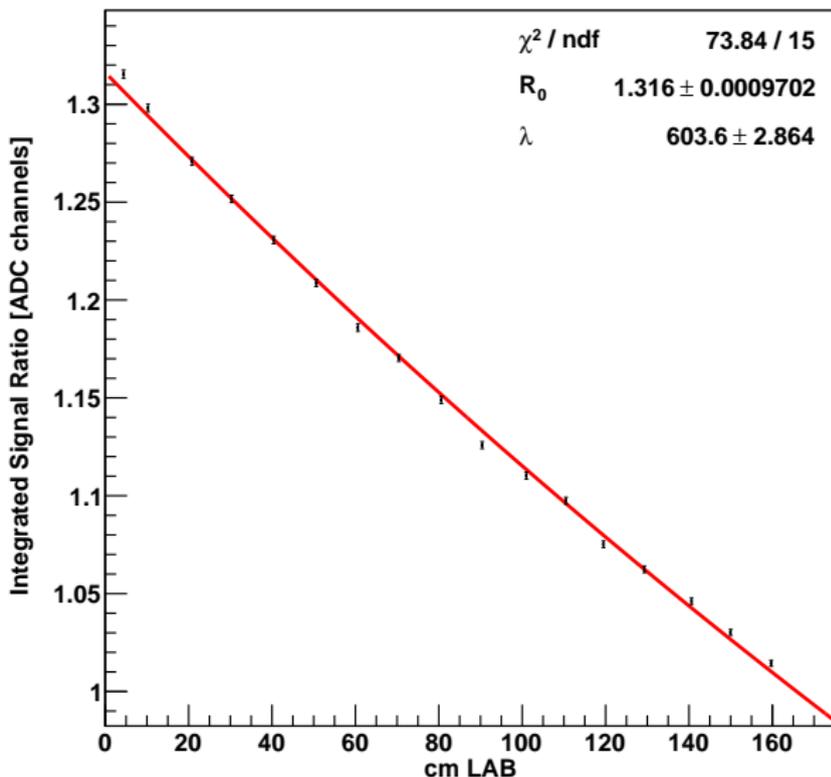
Extinction of  $405 \pm 5$  nm Light in LAB - 24 March 2009 - Series B



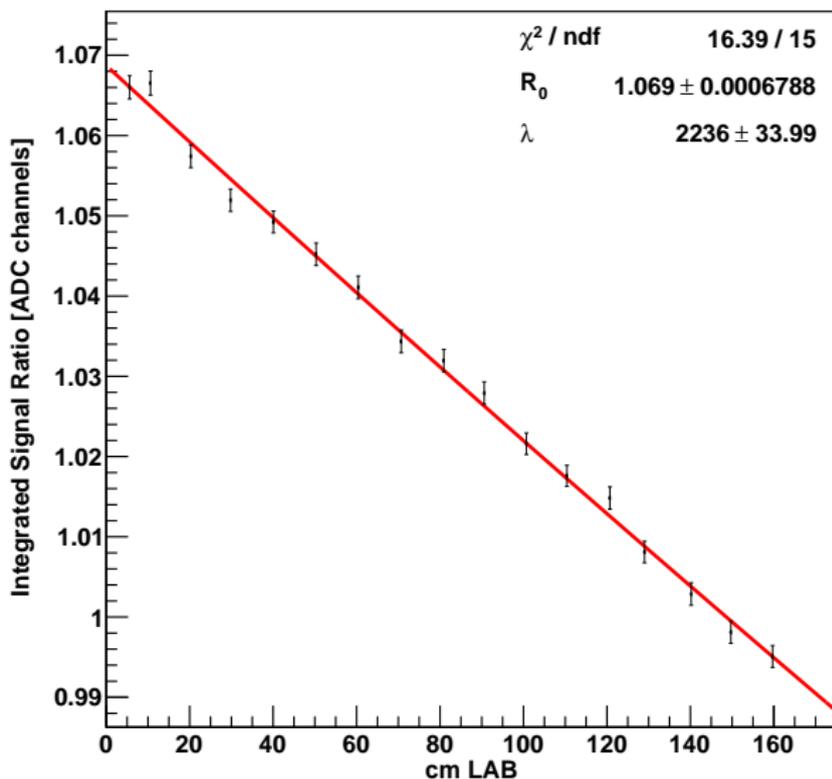
Extinction of  $470 \pm 5$  nm Light in Purified LAB - 24 March 2009 - Series C



Extinction of  $405 \pm 5$  nm Light in Purified LAB - 24 March 2009 - Series C



Extinction of  $470 \pm 5$  nm Light in Purified LAB - 24 March 2009 - Series D



Extinction of  $405 \pm 5$  nm Light in Purified LAB - 24 March 2009 - Series D

